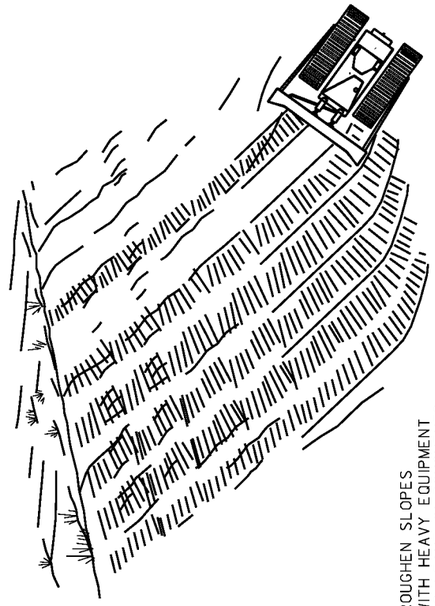
EROSION CONTROL SYMBOLS

BEST MANAGEMENT PRACTICE (BMP)	NAME	SYMBOL	DTL. DWG. NO.
SLOPE ROUGHENING	P-01	SR	208-05
STEPPED SLOPE	P-02	SS	208-07
TEMPORARY SEEDING	P-03	TS	208-10
EROSION SEEDING	P-04	ES	208-15
RUN-ON DIVERSION/CONTROL	P-05	RD	208-20
SLOPE DRAINS	P-06	SD	208-25
EROSION MAT	P-07	EM	208-30
DITCH SEDIMENT TRAPS	R-01	DT#	208-35
DUGOUT DITCH BASIN	R-02	DDB	208-40
GRAVEL FILTER BERM	R-03	GFB	208-45
SEDIMENT CONTROL FENCE	R-04	SCF	208-50
STRAW BALE BARRIER	R-05	SBB	208-55
VEGETATIVE BUFFER STRIP	R-06	VBS	208-60
RUNOFF INTERCEPTION DITCH	R-07	RID	208-65
PIPE INLET/OUTLET PROTECTION	R-08	I/O	208-70
WATERWAY PROTECTION	W-01	WP	208-75
WATER RESOURCE PROTECTION	W-02	WR	208-80

DETAILED DRAWING
REFERENCE STANDARD SPEC. SECTION 208
DWG. NO. 208-00
EROSION CONTROL SYMBOLS
EFFECTIVE: AUGUST 1999
MONTANA DEPARTMENT OF TRANSPORTATION
MONTANA CADD

DETAILED DRAWING
REFERENCE STANDARD SPEC. SECTION 208
DWG. NO. 208-05
SLOPE ROUGHENING (P-01)
EFFECTIVE: AUGUST 1999
MONTANA DEPARTMENT OF TRANSPORTATION
MONTANA CADD



ROUGHEN SLOPES
WITH HEAVY EQUIPMENT
OR LEAVE IN ROUGHENED
CONDITION

SYMBOL: SR

SLOPE ROUGHENING BMP P-01:

SLOPE ROUGHENING (SR) IS A VERY ROUGH SOIL SURFACE ON SLOPES RESULTING FROM CONSTRUCTION ACTIVITIES OR THE SYSTEMATIC ROUGHENING USING HEAVY EQUIPMENT TO CREATE RIDGES OR FURROWS PERPENDICULAR TO THE SLOPE. THE RIDGES OR FURROWS ARE TO BE EQUAL TO OR GREATER THAN 50 mm IN HEIGHT AND NO FURTHER THAN TWICE THE HEIGHT OF THE RIDGE OR FURROW APART. SLOPE ROUGHENING IS THE BEST FIRST LINE OF DEFENSE TO CONTROL EROSION AND SEDIMENT RUNOFF. DEGREE OF SLOPE ROUGHENING IS DEPENDENT ON THE GRADES AND PROXIMITY TO WATER RESOURCES.

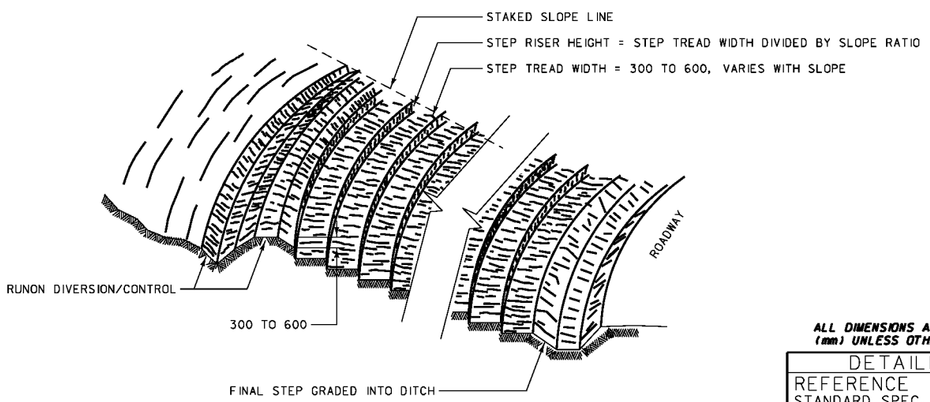
ALL SLOPES STEEPER THAN 3:1 AND GREATER THAN 1500 VERTICAL MILLIMETERS REQUIRE SLOPE ROUGHENING, EXCLUDING ROCK SLOPES THAT CANNOT BE EXCAVATED BY RIPPING. ROUGHEN DISTURBED SLOPES OR LEAVE IN A ROUGHENED CONDITION. APPROPRIATE SUPPLEMENTS INCLUDE TEMPORARY SEEDING OR EROSION SEEDING. WHEN FILL SLOPES ARE WITHIN 15 METERS OF SURFACE WATER, A SEDIMENT RETENTION BMP IS REQUIRED: EITHER SEDIMENT CONTROL FENCES OR RUNOFF INTERCEPTION DITCHES.

SYMBOL: SS

STEPPED SLOPE BMP P-02:

STEPPED SLOPE (SS) IS A VERY ROUGH SOIL SURFACE ON SLOPES WITH HORIZONTAL DEPRESSIONS/STAIR STEPPING CUTS OR TERRACES CREATED BY APPROPRIATE MACHINERY. THE USE OF THIS BMP IS TO BE DETERMINED BY THE ENGINEER.

WHEN POSSIBLE, HORIZONTALLY STEP ALL CUT SLOPES 2:1 AND STEEPER, EXCLUDING ROCK SLOPES THAT CANNOT BE EXCAVATED BY RIPPING. STEP SLOPES AT THE DISCRETION OF THE ENGINEER AND IN ACCORDANCE WITH MDT STANDARD SPECIFICATIONS 208 AND 203.03.1F.



ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 208	DWG. NO. 208-07
STEPPED SLOPE (P-02)	
EFFECTIVE: AUGUST 1999	
MONTANA DEPARTMENT OF TRANSPORTATION	MONTANA CADD

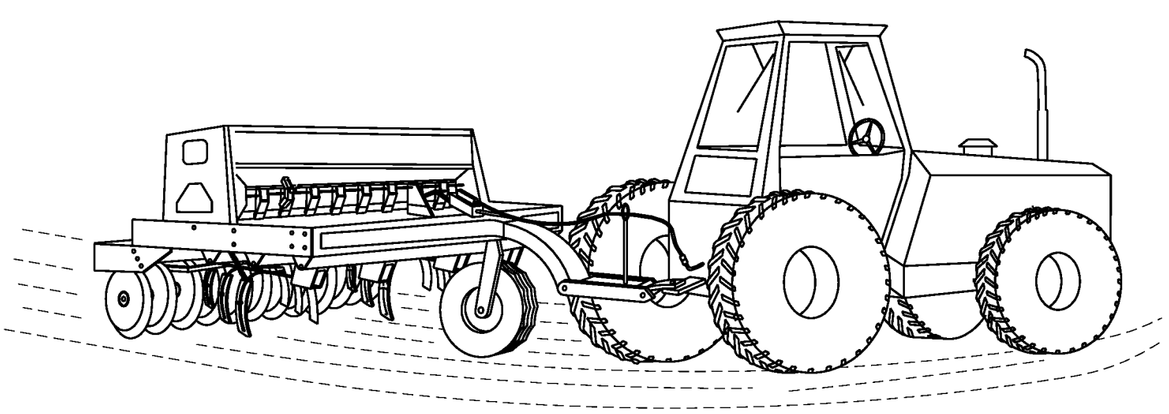
SYMBOL: TS

TEMPORARY SEEDING BMP P-03:

TEMPORARY SEEDING (TS) IS THE ESTABLISHMENT OF A TEMPORARY VEGETATIVE COVER BY SEEDING WITH CEREAL BARLEY. USE TEMPORARY SEEDING ON AREAS 3:1 OR FLATTER THAT WILL BE EXPOSED FOR LONGER THAN 14 DAYS AND THAT WILL UNDERGO FURTHER DISTURBANCE, EXCLUDING ROCK SLOPES THAT CANNOT BE EXCAVATED BY RIPPING.

SEEDING DATES AND APPLICATION RATES ARE AS FOLLOWS:
- APR. 1 TO JUN. 30: CEREAL BARLEY AT 13.5 kg/ha
- JUL. 1 TO AUG. 31: TEMPORARY SEEDING NOT RECOMMENDED
- SEP. 1 TO NOV. 15: CEREAL BARLEY AT 13.5 kg/ha (DO NOT TEMPORARY SEED IN THIS TIMEFRAME IF THE AREA IS TO BE PERMANENTLY SEEDED THAT FALL.)

CONTACT THE MDT AGRONOMIST PRIOR TO USING SUBSTITUTIONS OR PLACING TEMPORARY SEEDING OUTSIDE THESE DATES. DRILL SEED SLOPES OF 3:1 OR FLATTER. FOR SLOPES STEEPER THAN 3:1, REFER TO EROSION SEEDING.



SLOPES 3:1 OR FLATTER

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 208	DWG. NO. 208-10
TEMPORARY SEEDING (P-03)	
EFFECTIVE: AUGUST 1999	
MONTANA DEPARTMENT OF TRANSPORTATION	MONTANA CADD

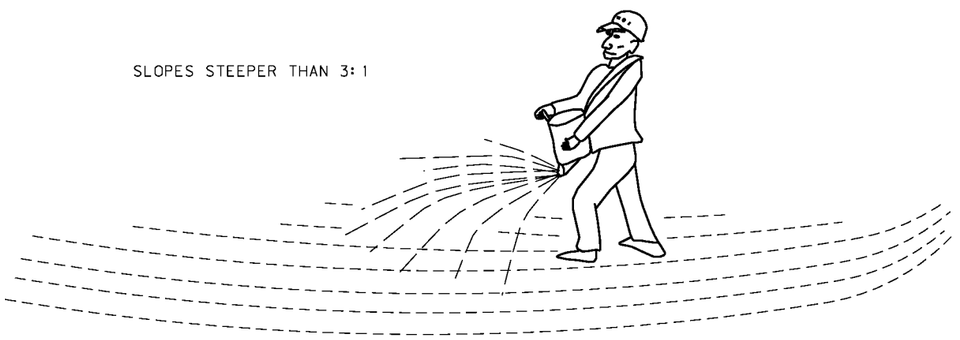
SYMBOL: ES

EROSION SEEDING BMP P-04:

EROSION SEEDING (ES) IS THE IMMEDIATE SEEDING OF FRESHLY EXPOSED SLOPES. USE EROSION SEEDING ON CUT AND FILL SLOPES STEEPER THAN 3:1 THAT WILL NOT UNDERGO FURTHER DISTURBANCE, EXCLUDING ROCK SLOPES THAT CANNOT BE EXCAVATED BY RIPPING. THIS SEEDING WILL NOT REPLACE OR SUBSTITUTE FOR FINAL SEEDING ACTIVITIES SPECIFIED IN THE SEEDING SPECIAL PROVISION.

SEED COMPLETED SECTIONS DAILY, REGARDLESS OF THE TIME OF YEAR. ACCOMPLISH SEEDING BY MANUAL BROADCASTING WITH A SHOULDER-HARNESSED SPREADER SEEDER OR ITS EQUIVALENT WITH NO MULCH OR FERTILIZER APPLIED. STORE THE RECOMMENDED SEED MIX ON-SITE PRIOR TO INITIATION OF SLOPE EXCAVATION. IF ONE OR MORE SPECIES IS UNAVAILABLE, CONTACT THE MDT AGRONOMIST FOR THE SUBSTITUTE. THE SEED MIX AND RATE OF APPLICATION ARE AS FOLLOWS:

DISTRICT	SPECIES	kg/ha PLS
1 (MISSOULA)	CANADA WILDRYE	3.5
	SECAR BLUEBUNCH WHEATGRASS	5.5
	CRITANA THICKSPIKE WHEATGRASS	5.5
	COVAR SHEEP FESCUE	2.0
	CEREAL BARLEY	5.5
2, 3, 5 (BUTTE, GREAT FALLS, BILLINGS)	CANADA WILDRYE	3.5
	SECAR BLUEBUNCH WHEATGRASS	5.5
	SODAR STREAMBANK WHEATGRASS	5.5
	COVAR SHEEP FESCUE	2.0
	CEREAL BARLEY	5.5
4 (GLENDIVE)	CANADA WILDRYE	3.5
	SECAR BLUEBUNCH WHEATGRASS	5.5
	ROSANA WESTERN WHEATGRASS	5.5
	LODORM GREEN NEEDLEGRASS	3.5
	CEREAL BARLEY	5.5



DETAILED DRAWING

REFERENCE STANDARD SPEC. SECTION 208 — DWG. NO. 208-15

EROSION SEEDING (P-04)

EFFECTIVE: AUGUST 1999

MONTANA DEPARTMENT OF TRANSPORTATION — MONTANA CADD

SYMBOL: RD

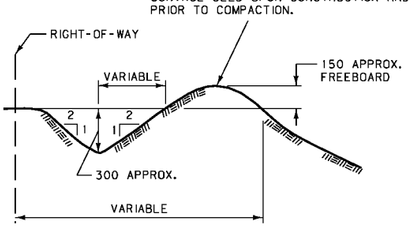
RUN-ON DIVERSION/CONTROL BMP P-05:

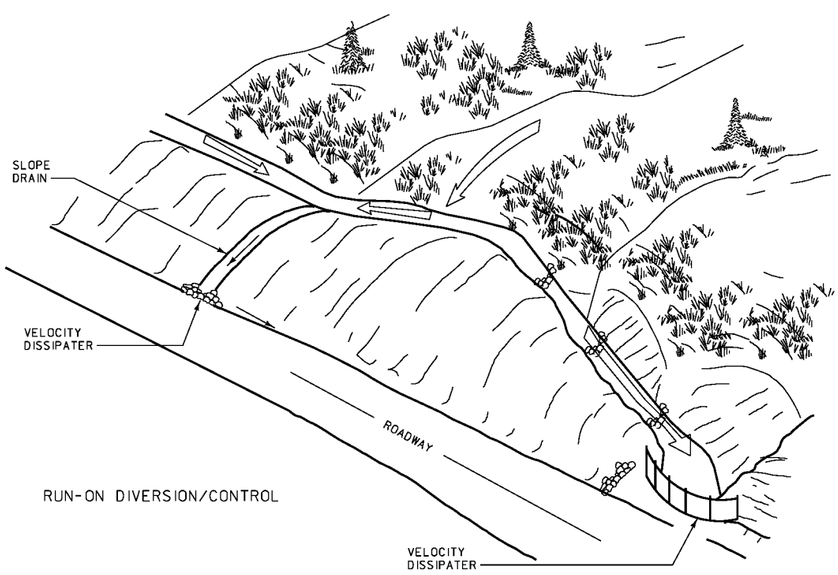
RUN-ON DIVERSION/CONTROL (RD) IS A BERM OF COMPACTED SOIL AND/OR A DITCH ON TOP OF CUT SLOPES TO INTERCEPT STORM WATER RUNOFF FROM THE DRAINAGE AREA ABOVE THE UNPROTECTED SLOPES AND DIRECT IT TO A STABILIZED OUTLET. IT IS USED ON THE TOP OF CUT SLOPES 2:1 AND STEEPER, EXCLUDING ROCK SLOPES THAT CANNOT BE EXCAVATED BY RIPPING, OR THE TOP OF FILL SLOPES WHERE THERE IS POTENTIAL FOR ROAD BED RUNOFF. THIS BMP CAN BE USED ON FLATTER SLOPES AT THE DISCRETION OF THE ENGINEER.

CONSTRUCT RUN-ON DIVERSION/CONTROL STRUCTURES IN CONJUNCTION WITH CLEARING AND GRUBBING AND PRIOR TO GRADING OPERATIONS. IF IT IS TO REMAIN IN PLACE FOR LONGER THAN 15 DAYS IT REQUIRES EROSION SEED, GRAVEL OR RIPRAP.

INSTALL SLOPE DRAINS WHERE NEEDED TO PREVENT CONCENTRATION OF WATER AND OVER-TOPPING OF BERM. PLACE VELOCITY DISSIPATERS AT THE TERMINUS OF DITCHES AND WHERE NEEDED. APPROPRIATE SUPPLEMENTS INCLUDE TEMPORARY SEEDING, EROSION SEEDING, SLOPE DRAINS OR DITCH SEDIMENT TRAPS.

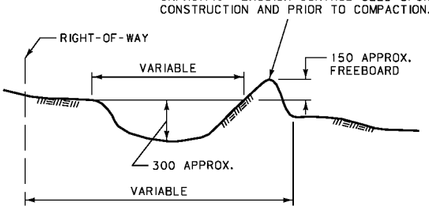
DENSIFY TO THE SATISFACTION OF THE ENGINEER. EXCAVATION FROM CONTOUR DITCH MAY BE PLACED ON DOWNSLOPE SIDE AND SHAPED TO FORM A DIKE TO INCREASE THE DITCH CAPACITY. EROSION CONTROL SEED UPON CONSTRUCTION AND PRIOR TO COMPACTION.





RUN-ON DIVERSION/CONTROL

EXCAVATION FROM CONTOUR DITCH MAY BE PLACED ON DOWNSLOPE SIDE AND SHAPED TO FORM A DIKE TO INCREASE THE DITCH CAPACITY. EROSION CONTROL SEED UPON CONSTRUCTION AND PRIOR TO COMPACTION.



ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

DETAILED DRAWING

REFERENCE STANDARD SPEC. SECTION 208 — DWG. NO. 208-20

RUN-ON DIVERSION/CONTROL (P-05)

EFFECTIVE: AUGUST 1999

MONTANA DEPARTMENT OF TRANSPORTATION — MONTANA CADD

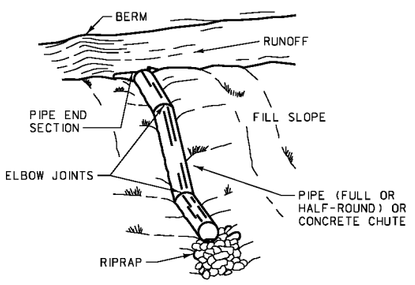
SYMBOL: SD

SLOPE DRAINS BMP P-06:

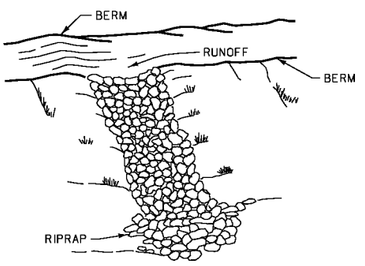
SLOPE DRAINS (SD) CONSIST OF A FLEXIBLE PIPE, RIGID PIPE, GEOTEXTILE-LINED CHANNEL OR RIPRAP-LINED CHANNEL. SLOPE DRAINS ARE USED WITH RUN-ON DIVERSION/ CONTROL OR ALONG THE TOE OF FILL IN CUT TO FILL TRANSITIONS. SLOPE DRAINS EXTEND FROM THE COLLECTION POINT TO THE BOTTOM OF THE SLOPE AND DISCHARGE INTO A DRAINAGE CHANNEL OR A STABILIZED AREA (NOT STATE WATERS).

SLOPE DRAINS CONVEY CONCENTRATED RUNOFF DOWN UNPROTECTED CUT OR FILL SLOPES OR CUT/FILL TRANSITIONS WITHOUT CAUSING GULLIES, CHANNELS, OR SATURATION OF SLIDE-PRONE SOILS OF A CUT OR FILL SLOPE. DESIGN RIPRAP-LINED DITCHES ON A SITE-SPECIFIC BASIS. RIPRAP SIZE IS A FUNCTION OF EXPECTED WATER VELOCITY. APPROPRIATE SUPPLEMENTS INCLUDE VELOCITY REDUCTION AND SEDIMENT RETENTION BARRIERS.

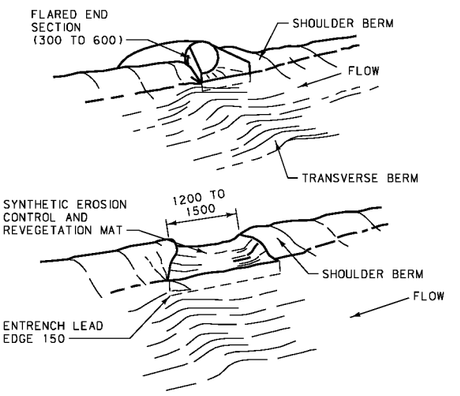
PIPE SLOPE DRAIN



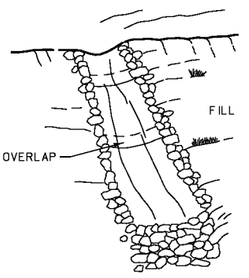
RIPRAP SLOPE DRAIN



SLOPE DRAIN INLETS



DITCH LINER: SYNTHETIC EROSION CONTROL AND REVEGETATION MAT



ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 208	DWG. NO. 208-25
SLOPE DRAINS (P-06)	
EFFECTIVE: AUGUST 1999	
MONTANA DEPARTMENT OF TRANSPORTATION	MONTANA CADD

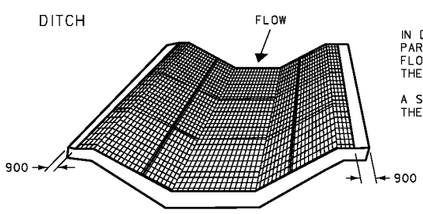
SYMBOL: EM

EROSION MAT BMP P-07:

EROSION MAT (EM) IS A VEGETATIVE MULCH MATERIAL, JUTE MAT OR SYNTHETIC GEOMEMBRANE THAT MUST BE ANCHORED. EROSION MATS ARE USED TO PROTECT EXPOSED SOILS, ENHANCE PLANT ESTABLISHMENT OR LINE DITCH BOTTOMS.

LAP EROSION MATS AND ANCHOR ACCORDING TO THE MANUFACTURER'S SPECIFICATIONS, CONFORMING WITH MDT STANDARD SPECIFICATION 610.03.4. BLANKET LENGTHS ARE LIMITED TO 8 METERS TO PREVENT BRIDGING OF THE BLANKET ABOVE SETTLING SOILS. EXTEND THE TOP EDGE OF THE BLANKET AT LEAST 900 mm BEYOND THE TOP OF THE SLOPE. EROSION MATS ARE REQUIRED WHEN THE MOST ERODABLE CONDITIONS EXIST IN THE SOIL, SLOPE, SURFACE WATER AND PRECIPITATION CATEGORIES.

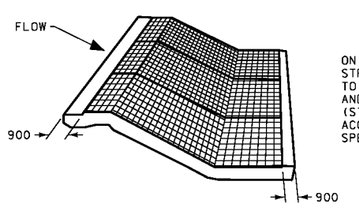
DITCH



IN DITCHES, APPLY NETTING PARALLEL TO THE DIRECTION OF FLOW. DO NOT JOIN STRIPS IN THE CENTER OF THE DITCH.

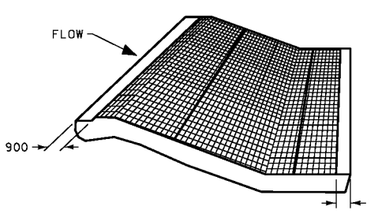
A SINGLE RUN MAY BE USED AT THE DISCRETION OF THE ENGINEER.

STEEP SLOPE



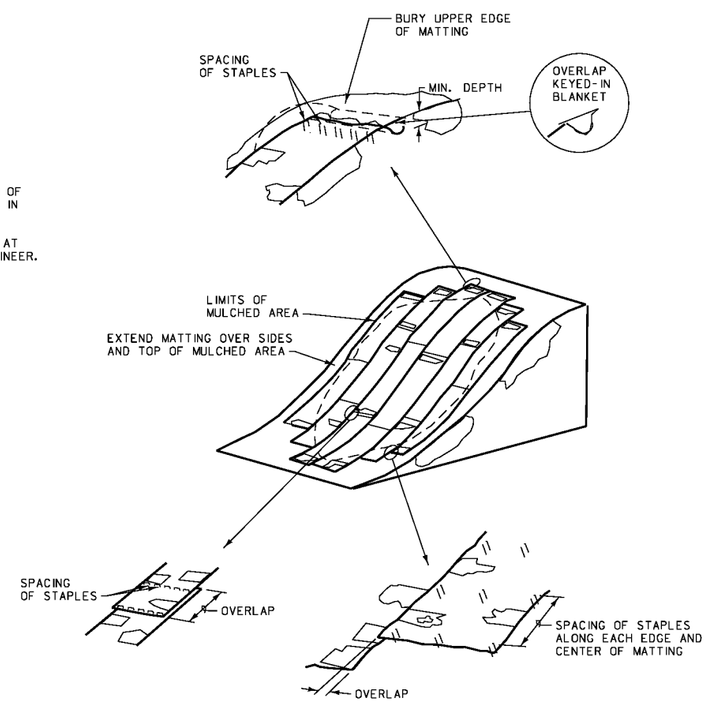
ON STEEP SLOPES, APPLY STRIPS OF NETTING PARALLEL TO THE DIRECTION OF FLOW AND ANCHOR SECURELY (STEEPER THAN 3:1 OR ACCORDING TO MANUFACTURER'S SPECIFICATIONS).

SHALLOW SLOPE



ON SHALLOW SLOPES, APPLY STRIPS OF NETTING ACROSS THE SLOPE (3:1 OR FLATTER OR ACCORDING TO MANUFACTURER'S SPECIFICATIONS).

INSTALL ACCORDING TO THE MANUFACTURER'S SPECIFICATIONS.



ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 208	DWG. NO. 208-30
EROSION MAT (P-07)	
EFFECTIVE: AUGUST 1999	
MONTANA DEPARTMENT OF TRANSPORTATION	MONTANA CADD

SYMBOL: DT#

DITCH SEDIMENT TRAPS BMP R-01:

DITCH SEDIMENT TRAPS (DT#) IS TERMINOLOGY USED TO DESCRIBE THE SELECTION OF ONE OF FOUR TEMPORARY SEDIMENT BARRIERS USED AT INTERVALS ALONG A CONCENTRATED RUNOFF FLOW PATH. THE DESIGNER DETERMINES THE LOCATIONS REQUIRING DITCH SEDIMENT TRAPS AND THE PROPER INTERVALS AND THE ENGINEER DETERMINES WHICH TEMPORARY SEDIMENT BARRIER WILL BE USED. REFER TO DUGOUT DITCH BASIN, GRAVEL FILTER BERM, SEDIMENT CONTROL FENCE AND EROSION MAT DETAILED DRAWINGS FOR INSTALLATIONS.

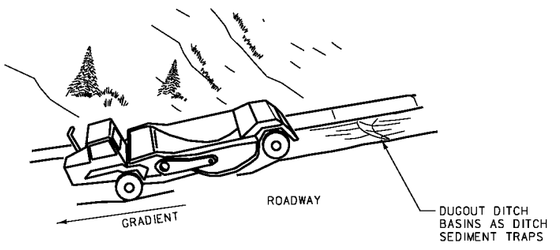
DITCH SEDIMENT TRAPS ARE USED FOR LONGITUDINAL ROADSIDE DITCHES IN A CUT SECTION OR AS LONGITUDINAL SEDIMENT RETENTION BASINS AT THE TOE OF FILLS. DITCH SEDIMENT TRAPS REDUCE RUNOFF VELOCITY AND PROMOTE SEDIMENT SETTLING. THE DISTANCE BETWEEN DITCH SEDIMENT TRAPS IS DEPENDENT ON THE LENGTH OF DITCH SECTION RELATING TO THE GRADE THAT NEEDS SEDIMENT RETENTION. THE INTERVAL IS AS FOLLOWS:

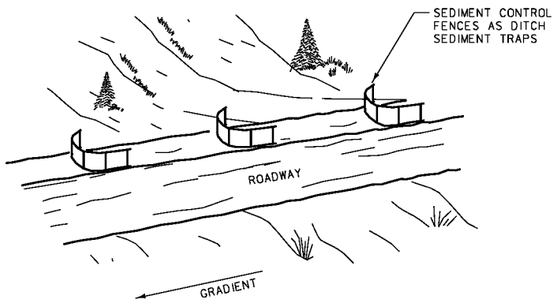
DT1 = 2% TO 3%
DUGOUT DITCH BASINS AT 90 METERS OR
GRAVEL FILTER BERMS AT 90 METERS OR
SEDIMENT CONTROL FENCES AT 150 METERS OR
EROSION MAT

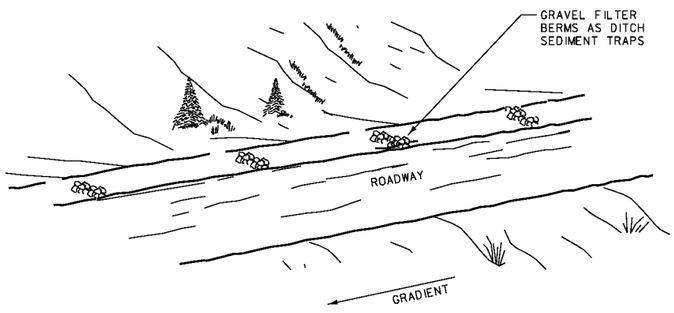
DT2 = 3% TO 4%
DUGOUT DITCH BASINS AT 45 METERS OR
GRAVEL FILTER BERMS AT 60 METERS OR
SEDIMENT CONTROL FENCES AT 90 METERS OR
EROSION MAT

DT3 = 4% +
DUGOUT DITCH BASINS AT 15 METERS OR
GRAVEL FILTER BERMS AT 30 METERS OR
SEDIMENT CONTROL FENCES AT 45 METERS OR
EROSION MAT

THESE VALUES ARE EMPIRICAL; THEY ARE THE MAXIMUM INTERVAL DISTANCES FOR A 2 YEAR, 24 HOUR RAIN EVENT. INTERVALS MAY BE SHORTENED AT THE DISCRETION OF THE ENGINEER IF SOIL CONDITIONS AND/OR PRECIPITATION INDICATE A NEED TO DO SO.







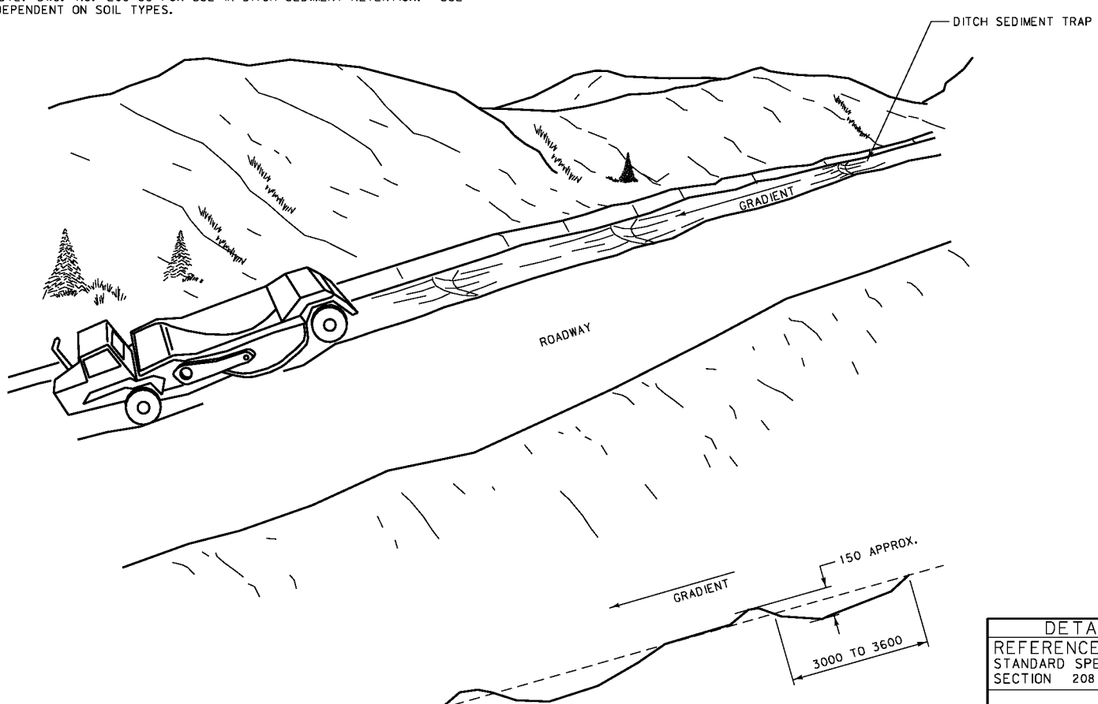
DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 208	DWG. NO. 208-35
DITCH SEDIMENT TRAPS (R-01)	
EFFECTIVE: AUGUST 1999	
MONTANA DEPARTMENT OF TRANSPORTATION / MONTANA CADD	

SYMBOL: DDB

DUGOUT DITCH BASIN BMP R-02:

DUGOUT DITCH BASINS (DDB) CONSIST OF ONE OR A SERIES OF SMALL DUGOUT BASINS USED FOR CONCENTRATED FLOWS TO REDUCE RUNOFF VELOCITY, PROMOTE SEDIMENT RETENTION AND ALLOW SETTLING. THE MAXIMUM HEIGHT FOR DUGOUT DITCH BASINS USED INSIDE THE CLEAR ZONE IS 150 mm.

DUGOUT DITCH BASINS ARE USED FOR LONGITUDINAL SLOPE STEEPNESS (GRADE) SEDIMENT RETENTION. APPLICATIONS INCLUDE DITCH SEDIMENT TRAPS, INTERCEPTOR DITCHES AND TOE OF SLOPE PROTECTION. DISTANCES BETWEEN DUGOUT DITCH BASINS ARE SHOWN ON DTL. DWG. NO. 208-35 FOR USE IN DITCH SEDIMENT RETENTION. USE ON SLOPES IS DEPENDENT ON SOIL TYPES.



ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 208	DWG. NO. 208-40
DUGOUT DITCH BASIN (R-02)	
EFFECTIVE: AUGUST 1999	
MONTANA DEPARTMENT OF TRANSPORTATION / MONTANA CADD	

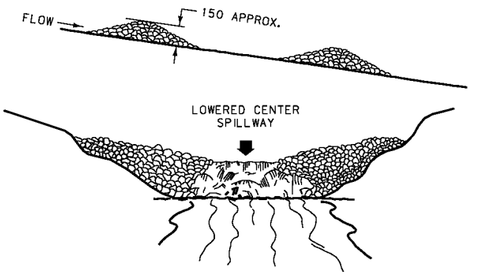
SYMBOL: GFB

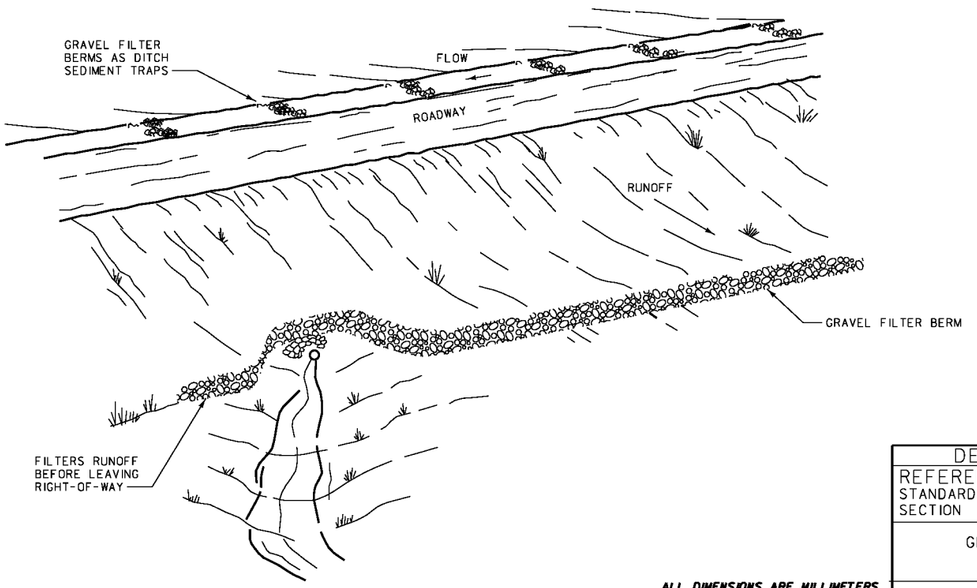
GRAVEL FILTER BERM BMP R-03:

GRAVEL FILTER BERMS (GFB) CONSIST OF A SINGLE OR SERIES OF GRAVEL BERMS TO REDUCE RUNOFF VELOCITIES AND RETAIN SEDIMENT. THE MAXIMUM HEIGHT FOR GRAVEL FILTER BERMS USED INSIDE THE CLEAR ZONE IS 150 mm.

BERM MATERIAL MUST BE 100% PASSING THE 50 mm SCREEN AND 10% MAXIMUM PASSING THE 4.75 mm SIEVE. BERM MATERIAL MAY BE PITRUN OR CRUSHED AGGREGATE.

GRAVEL FILTER BERMS ARE USED FOR SHEET OR CONCENTRATED FLOWS TO REDUCE RUNOFF VELOCITY, PROMOTE SEDIMENT RETENTION AND ALLOW SETTLING. APPLICATIONS INCLUDE DITCH SEDIMENT TRAPS, INLET/OUTLET PROTECTION AND TOE OF SLOPE PROTECTION. AS A DITCH SEDIMENT TRAP, THE END OF THE BARRIER MUST EXTEND A SUFFICIENT DISTANCE TO PREVENT END CUTTING. POSITION THE BARRIER TO PREVENT SEDIMENT FROM ENTERING DRAINAGE. DO NOT PLACE THE BARRIER ACROSS LIVE STREAMS. DISTANCES BETWEEN GRAVEL FILTER BERMS ARE SHOWN ON DTL. DWG. NO. 208-35 FOR USE IN DITCH SEDIMENT RETENTION. REMOVE SEDIMENT FROM BEHIND THE BERM WHEN IT ACCUMULATES TO ONE-HALF THE ORIGINAL HEIGHT UNLESS ITS DRAINAGE AREA HAS BEEN STABILIZED.





ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 208	DWG. NO. 208-45
GRAVEL FILTER BERM (R-03)	
EFFECTIVE: AUGUST 1999	
MONTANA DEPARTMENT OF TRANSPORTATION — MONTANA CADD	

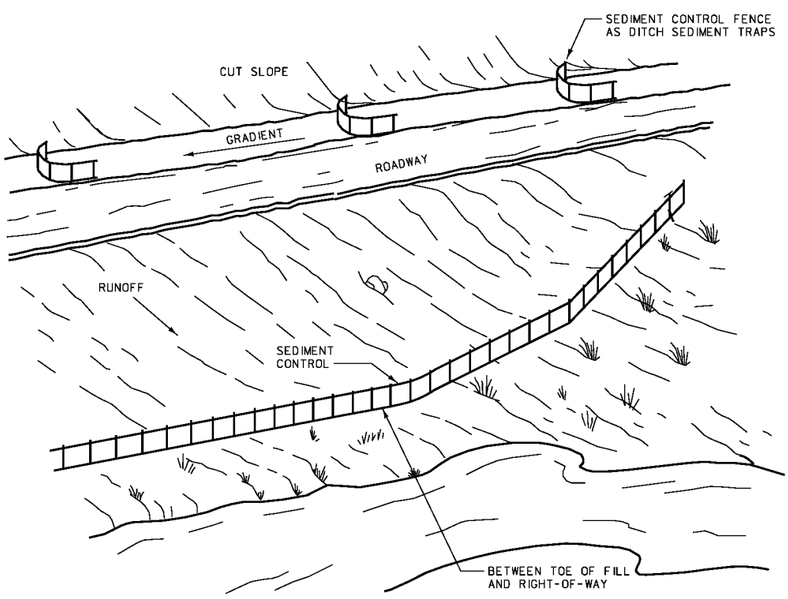
SYMBOL: SCF

SEDIMENT CONTROL FENCE BMP R-04:

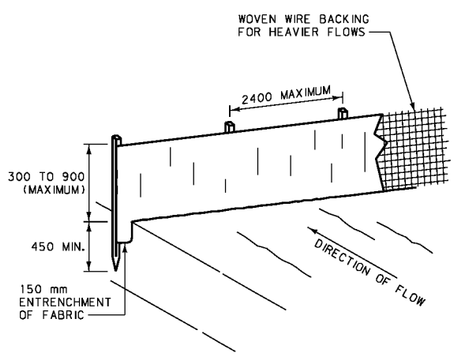
SEDIMENT CONTROL FENCE (SCF) IS A SINGLE OR SERIES OF FILTER FABRIC SEDIMENT BARRIER STRETCHED AND ATTACHED TO SUPPORTING POSTS. THE FENCE BOTTOM IS ENTRENCHED.

SEDIMENT CONTROL FENCES ARE USED FOR SHEET OR CONCENTRATED FLOWS TO ASSIST IN SEDIMENT CONTROL BY RETAINING SOME OF THE ERODED SOIL PARTICLES AND SLOWING THE RUNOFF VELOCITY TO ALLOW PARTICLE SETTLING. APPLICATIONS INCLUDE DITCH SEDIMENT TRAPS, WATER RESOURCE PROTECTION, INLET/OUTLET PROTECTION, BANK PROTECTION, TOE OF SLOPE PROTECTION AND CHANNEL CHANGES. INSTALL SEDIMENT CONTROL FENCES PRIOR TO DISTURBING AREAS REQUIRING THIS BMP OR AS SLOPE GRADES ARE ACHIEVED. MAXIMUM CUT OR FILL SLOPE FOR A SEDIMENT CONTROL FENCE IS 2:1. USE 50 mm BY 50 mm (NOMINAL) WOODEN STAKES. DO NOT USE METAL STAKES.

SEDIMENT CONTROL FENCES ARE USED BETWEEN THE EDGE OF CONSTRUCTION DISTURBANCE AND A WATER RESOURCE, CRITICAL RESOURCE OR RIGHT-OF-WAY LINE THAT IS ADJACENT TO CONSTRUCTION ACTIVITY. IN DITCHES AND SWALES THE ENDS OF THE FENCE CURVE UPSTREAM TO PREVENT FLOW FROM BY-PASSING THE FENCE. POSITION THE BARRIER TO PREVENT SEDIMENT FROM ENTERING THE DRAINAGE. DO NOT PLACE THE BARRIER ACROSS LIVE STREAMS. WOVEN WIRE BACKING IS NECESSARY WHEN DEALING WITH HEAVIER FLOW VELOCITIES AND SEDIMENT OR AS A ROCK BARRIER. DISTANCES BETWEEN SEDIMENT CONTROL FENCES ARE SHOWN ON DTL. DWG. NO. 208-35 FOR USE IN DITCH SEDIMENT RETENTION. REMOVE SEDIMENT FROM BEHIND THE FENCE WHEN IT ACCUMULATES TO ONE-THIRD THE ORIGINAL HEIGHT. EITHER GRADE AND SEED OR REMOVE THE SEDIMENT DEPOSITS PRIOR TO REMOVAL OF THE FENCE.



DITCH SEDIMENT TRAPS & PROTECTION OF LIVE STREAM



SILT FENCE CONSTRUCTION

ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 208	DWG. NO. 208-50
SEDIMENT CONTROL FENCE (R-04)	
EFFECTIVE: AUGUST 1999	
MONTANA DEPARTMENT OF TRANSPORTATION — MONTANA CADD	

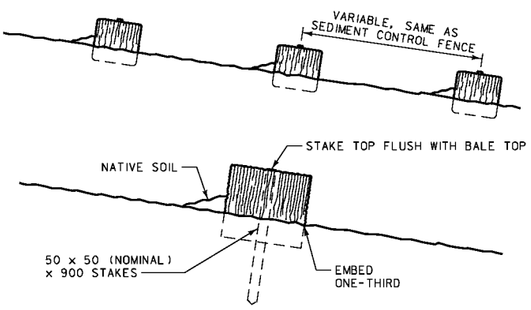
SYMBOL: SBB

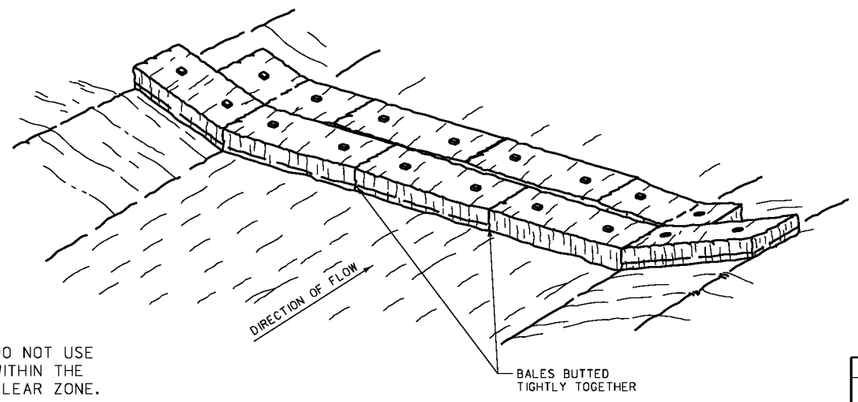
STRAW BALE BARRIER BMP R-05:

STRAW BALE BARRIER (SBB) IS A SEDIMENT BARRIER CONSISTING OF ENTRENCHED, OVERLAPPING AND ANCHORED STRAW BALES TO REDUCE RUNOFF VELOCITIES AND RETAIN SEDIMENT. DO NOT USE STRAW BALE BARRIERS INSIDE THE CLEAR ZONE. STRAW BALES MUST BE CERTIFIED WEED-FREE.

STRAW BALE BARRIERS ARE USED FOR SHEET OR CONCENTRATED FLOWS TO REDUCE RUNOFF VELOCITY, PROMOTE SEDIMENT RETENTION AND ALLOW SETTLING. ENTRENCH THE BARRIER APPROXIMATELY ONE-THIRD OF THE BALE'S HEIGHT AND BACKFILL ON THE UPHILL SIDE. USE 50 mm BY 50 mm (NOMINAL) BY 900 mm LONG WOODEN STAKES. DO NOT USE METAL STAKES. USE A MINIMUM OF TWO STAKES PER BALE.

AS A DITCH SEDIMENT TRAP, EXTEND THE END OF THE BARRIER TO SUCH AN EXTENT THAT THE BOTTOMS OF THE END BALES ARE HIGHER THAN THE TOPS OF THE LOWEST CENTER BALES. POSITION THE BARRIER TO PREVENT SEDIMENT FROM ENTERING THE DRAINAGE. DO NOT PLACE THE BARRIER ACROSS LIVE STREAMS. REPAIR OR REPLACE DAMAGED, UNDER-CUT OR END RUN BALES. APPLICATIONS INCLUDE (OUTSIDE THE CLEAR ZONE) DITCH SEDIMENT TRAPS, INLET/OUTLET PROTECTION, BANK PROTECTION AND TOE OF SLOPE PROTECTION.





DO NOT USE WITHIN THE CLEAR ZONE.

ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

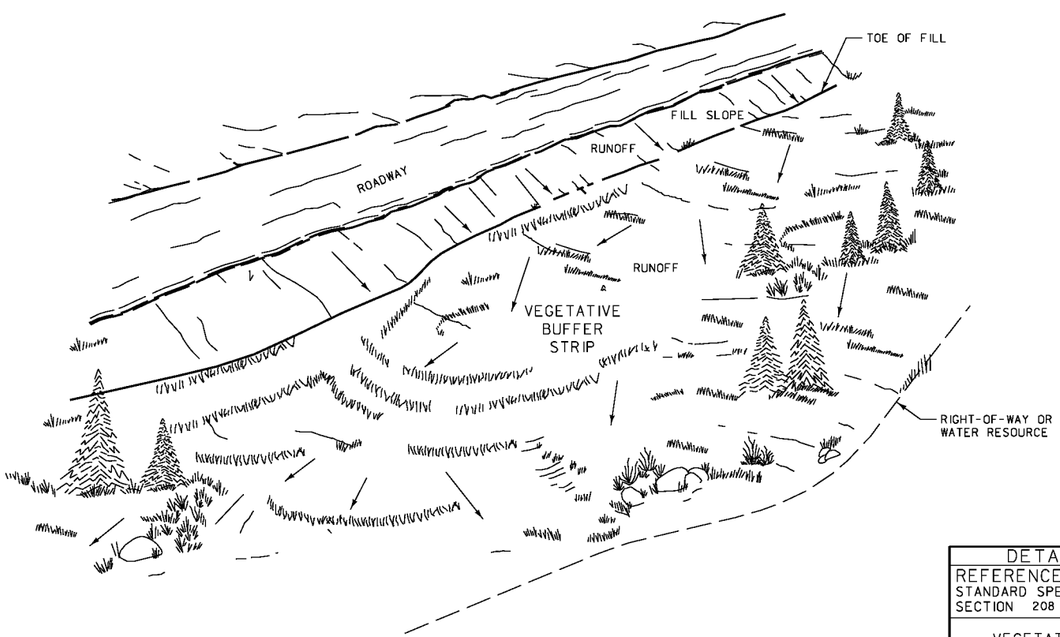
DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 208	DWG. NO. 208-55
STRAW BALE BARRIER (R-05)	
EFFECTIVE: AUGUST 1999	
MONTANA DEPARTMENT OF TRANSPORTATION — MONTANA CADD	

SYMBOL: VBS

VEGETATIVE BUFFER STRIP BMP R-06:

VEGETATIVE BUFFER STRIP (VBS) IS AN UNDISTURBED AREA OR STRIP OF ESTABLISHED NATURAL VEGETATION. A VEGETATIVE BUFFER STRIP PROVIDES A LIVING SEDIMENT FILTER TO REDUCE RUNOFF VELOCITIES AND ALLOW CAPTURE AND SETTLING OF COARSE-GRAINED SEDIMENT. VEGETATIVE BUFFER STRIPS REDUCE OR PREVENT SEDIMENTATION FROM LEAVING THE RIGHT-OF-WAY.

IDENTIFY VEGETATIVE BUFFER STRIPS WITH FLAGGING BEFORE CONSTRUCTION OCCURS. KEEP EQUIPMENT AND FILL MATERIAL OFF OF VEGETATIVE BUFFER STRIPS. ALWAYS CONSIDER VEGETATIVE BUFFER STRIPS WHEN WATER RESOURCES ARE ADJACENT TO OR NEAR DISTURBANCES AND REQUIRE PROTECTION. THE MINIMUM WIDTH REQUIREMENT FOR A WELL-ESTABLISHED VEGETATIVE STRIP WITH A SLOPE OF 3:1 OR FLATTER IS 15 m. THE MINIMUM WIDTH REQUIREMENT FOR A WELL-ESTABLISHED VEGETATIVE STRIP WITH A SLOPE STEEPER THAN 3:1 IS 30 m. APPROPRIATE SUPPLEMENTS INCLUDE GRAVEL BERMS, SEDIMENT CONTROL FENCES AND OTHER SEDIMENT RETENTION BARRIERS.



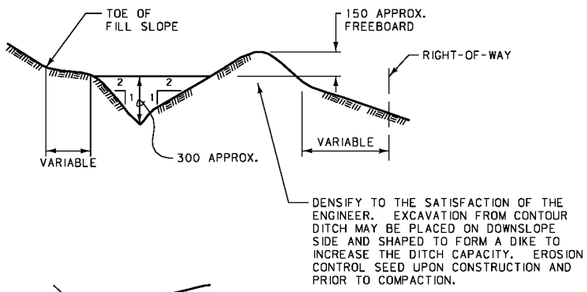
DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 208	DWG. NO. 208-60
VEGETATIVE BUFFER STRIP (R-06)	
EFFECTIVE: AUGUST 1999	
MONTANA DEPARTMENT OF TRANSPORTATION — MONTANA CADD	

SYMBOL: RID

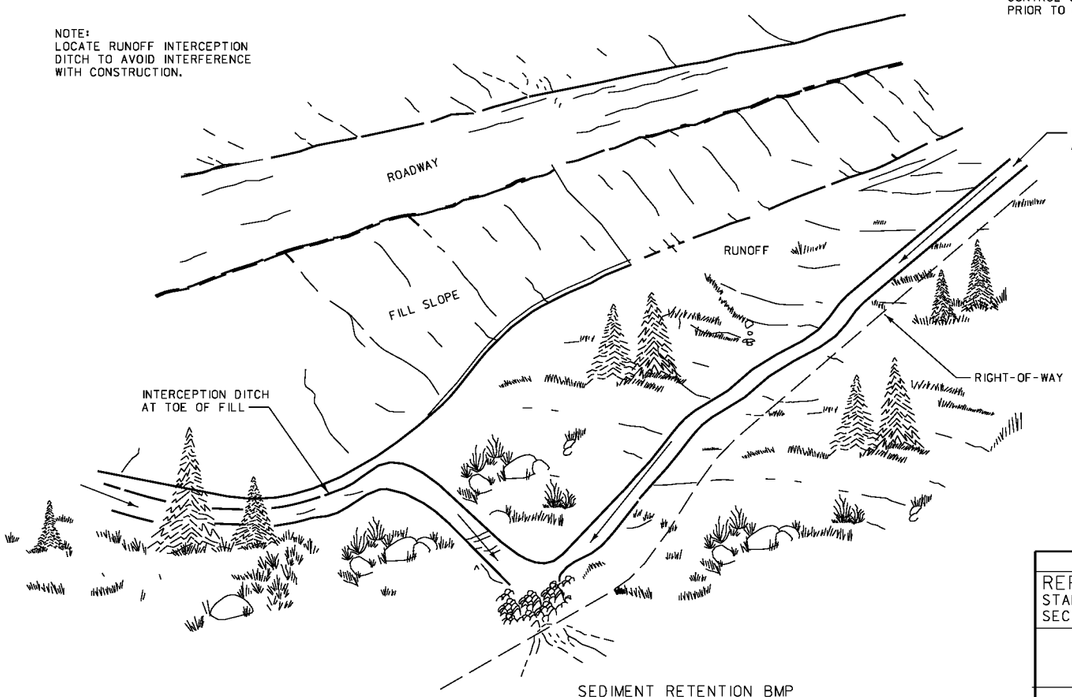
RUNOFF INTERCEPTION DITCH BMP R-07:

RUNOFF INTERCEPTION DITCHES (RID) INTERCEPT AND CONVEY SHEET FLOW RUNOFF TO SEDIMENT RETENTION BARRIERS. INTERCEPTED FLOWS PREVENT OFF-SITE DISCHARGE OF STORM WATER AND SEDIMENTATION.

USE RUNOFF INTERCEPTION DITCHES AT THE TOE OF SLOPES OR BETWEEN DISTURBED AREAS AND RIGHT-OF-WAY LINES TO PREVENT FLOWS FROM CARRYING SEDIMENT OFF-SITE. APPROPRIATE SUPPLEMENTS INCLUDE SLOPE DRAINS OR DITCH SEDIMENT TRAPS.



NOTE:
LOCATE RUNOFF INTERCEPTION DITCH TO AVOID INTERFERENCE WITH CONSTRUCTION.



SEDIMENT RETENTION BMP

ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

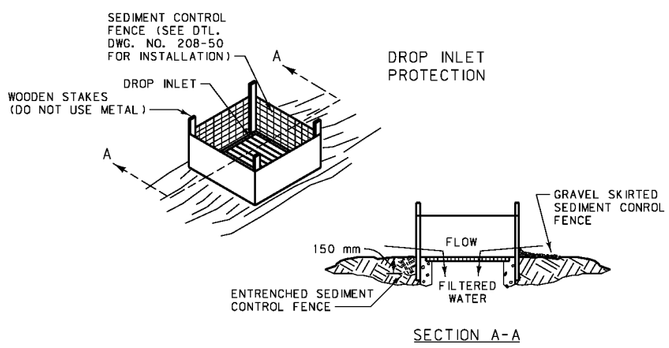
DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 208	DWG. NO. 208-65
RUNOFF INTERCEPTION DITCH (R-07)	
EFFECTIVE: AUGUST 1999	
MONTANA DEPARTMENT OF TRANSPORTATION — MONTANA CADD	

SYMBOL: I/O

INLET/OUTLET PROTECTION BMP R-08:

INLET/OUTLET PROTECTION (I/O) ARE STRUCTURES ASSOCIATED WITH SEDIMENT REMOVAL AT INLETS AND SEDIMENT REMOVAL AT PIPE OUTLETS. THE PURPOSE OF THIS BMP IS TO ALLOW STORM WATERS OF INTERMITTENT DRAINAGES TO FLOW THROUGH DISTURBED AREAS WITH MINIMAL IMPACT DURING STORM EVENTS AND TO KEEP SEDIMENT FROM LEAVING MDT PROPERTY.

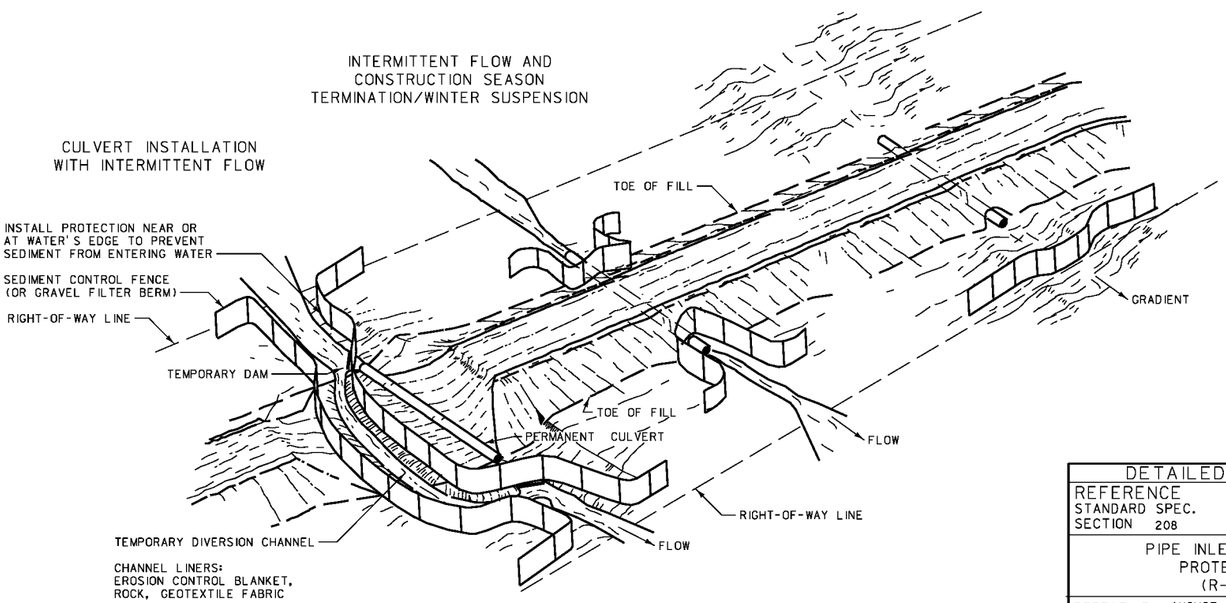
INLET/OUTLET PROTECTION IS USED AT CULVERT INSTALLATIONS THAT DISCHARGE DIRECTLY INTO A WATER RESOURCE OR CULTURAL AND HISTORICAL RESOURCE ADJACENT TO THE RIGHT-OF-WAY LINE. DO NOT USE INLET/OUTLET PROTECTION ON STOCK UNDERPASSES OR APPROACH CULVERTS.



CULVERT IN A SWALE

INTERMITTENT FLOW AND CONSTRUCTION SEASON TERMINATION/WINTER SUSPENSION

CULVERT INSTALLATION WITH INTERMITTENT FLOW



DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 208	DWG. NO. 208-70
PIPE INLET/OUTLET PROTECTION (R-08)	
EFFECTIVE: AUGUST 1999	
MONTANA DEPARTMENT OF TRANSPORTATION — MONTANA CADD	

SYMBOL: WP

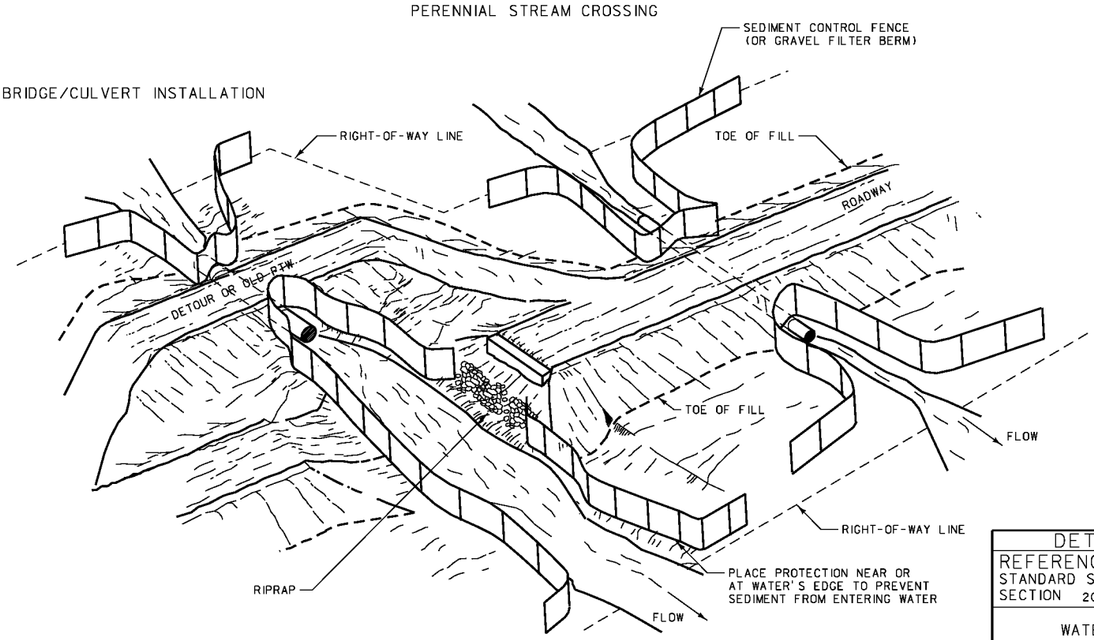
WATERWAY PROTECTION BMP W-01:

WATERWAY PROTECTION (WP) IS AN EROSION CONTROL FOR CONSTRUCTION ACTIVITIES CROSSING WATER RESOURCES. WATERWAY PROTECTION APPLIES TO PERENNIAL STREAM CROSSINGS, WETLANDS, CHANNEL CHANGES, STREAM BANK DISTURBANCES, IRRIGATION SYSTEMS OR OTHER IMPACTS TO WATER RESOURCES FROM BRIDGE CONSTRUCTION OR CULVERT INSTALLATIONS.

APPROPRIATE BMP FEATURES INCLUDE EROSION MAT, GRAVEL FILTER BERM, SEDIMENT CONTROL FENCE, STRAW BALE BARRIER OR VEGETATIVE BUFFER STRIP. ADDITIONAL BMP FEATURES INCLUDE SLOPE ROUGHENING, RUN-ON DIVERSION/CONTROL, DITCH SEDIMENT TRAP, DUGOUT DITCH BASINS AND RUNOFF INTERCEPTION DITCH. THIS BMP LIST IS NOT COMPREHENSIVE AND DOES NOT SUPERSEDE MDT STANDARD SPECIFICATIONS OR MANDATES AND REQUIREMENTS SPECIFIED BY OTHER AUTHORIZED STATE AND FEDERAL AGENCIES.

PERENNIAL STREAM CROSSING

BRIDGE/CULVERT INSTALLATION



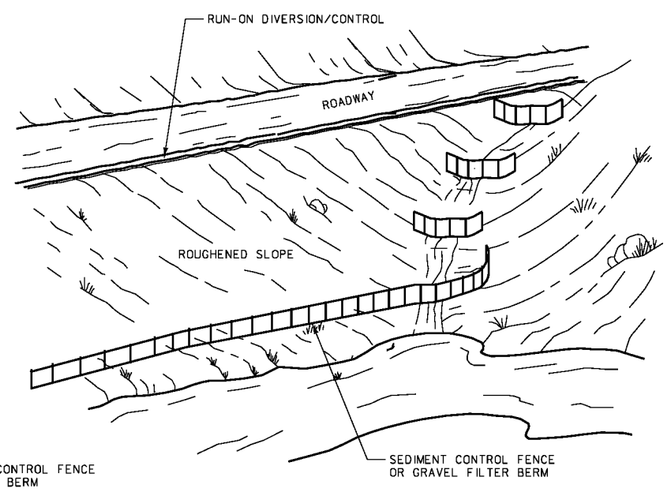
DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 208	DWG. NO. 208-75
WATERWAY PROTECTION (W-01)	
EFFECTIVE: AUGUST 1999	
MDT MONTANA DEPARTMENT OF TRANSPORTATION	MONTANA CADD

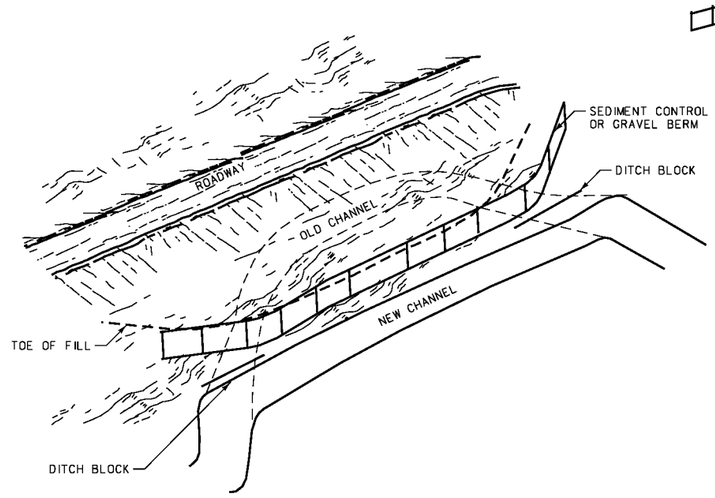
SYMBOL: WR

WATER RESOURCE PROTECTION BMP W-02:

WATER RESOURCE PROTECTION (WR) IS EROSION CONTROL FOR CONSTRUCTION ACTIVITIES ADJACENT TO WATER RESOURCES. WATER RESOURCE PROTECTION APPLIES TO PERENNIAL STREAMS, WETLANDS, CHANNEL CHANGES, STREAM BANK DISTURBANCES, IRRIGATION SYSTEMS OR OTHER IMPACTS TO WATER RESOURCES FROM ROAD CONSTRUCTION. IT CAN BE USED FOR CRITICAL RESOURCES. THE DESIGNER DENOTES "CRITICAL RESOURCE" ON THE PLANS AND PUTS WATER RESOURCE PROTECTION WITH IT.

APPROPRIATE BMP FEATURES INCLUDE EROSION MAT, GRAVEL FILTER BERM, SEDIMENT CONTROL FENCE, STRAW BALE BARRIER OR VEGETATIVE BUFFER STRIP. ADDITIONAL BMP FEATURES INCLUDE SLOPE ROUGHENING, RUN-ON DIVERSION/CONTROL, DITCH SEDIMENT TRAP, DUGOUT DITCH BASINS AND RUNOFF INTERCEPTION DITCH. THIS BMP LIST IS NOT COMPREHENSIVE AND DOES NOT SUPERSEDE MDT STANDARD SPECIFICATIONS OR MANDATES AND REQUIREMENTS SPECIFIED BY OTHER AUTHORIZED STATE AND FEDERAL AGENCIES.





DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 208	DWG. NO. 208-80
WATER RESOURCE PROTECTION (W-02)	
EFFECTIVE: AUGUST 1999	
MDT MONTANA DEPARTMENT OF TRANSPORTATION	MONTANA CADD